

DETAILED ACTION

1. In response to the Preliminary Amendment filed on December 16, 2004, amended claim 1 and the newly added claims 2-23 are pending.

Specification

2. The abstract of the disclosure is objected to because it is over 150 words. Correction is required. See MPEP § 608.01(b).

Drawings

3. The drawings 9E, 9F, and 9G are objected to under 37 CFR 1.83(a) because they fail to show the audio output beam patterns as described in the specification. The graphs require axis labels. It also appears that the drawings may be contradictory to the subject matter in the specification, specifically that the frequency directly correlates to the width of the beam, although a conclusive determination cannot be made without proper axis labels. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of

Art Unit: 4114

the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The subject matter of claim 23 relies on knowledge of the KZK equation to explain how increasing the frequencies of the ultrasonic carrier signals will increase the width of the beams (The disclosures of Zabolotskaya et al. and Kuznetsov, cited in the specification, are not exemplary regarding the KZK equation). It is not commonly known in the art that increasing the frequency will result in increasing beam widths and therefore the specification is not enabling for one of ordinary skill in the art to make or use the invention as in claim 23.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-6, 9 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Takahashi et al (US Pat. No. 6,643,377).

Regarding claim 1, Takahashi et al. teaches a directional audio delivery apparatus for a system, comprising: a box that receives incoming encoded signals and provides decoded audio signals for use by the system (set top box, Fig. 1, 106); audio conversion circuitry that produces ultrasonic signals based on the decoded audio signals provided by said box (It is inherent in the disclosure of Takahashi et al. that there is circuitry that produces ultrasonic signals based on the audio signals provided by the box. This is shown by the carrier wave superposed with an audio wave at the output. There must be some circuitry that generates the carrier wave in the system. Otherwise, there could be no carrier wave generated at the audio output as stated by Takashi et al., Col. 3, line 49-53); and a directional speaker that outputs an ultrasonic output based on the ultrasonic signals (ultrasonic speaker 102 emitting highly directional ultrasonic wave, Col. 3, line 44-46).

Regarding claim 2, Takahashi et al. teaches a directional audio delivery apparatus as recited in claim 1, wherein said system is one of an audio system (audio output system, see title of Takahashi et al.), a stereo system, a television system, a radio receiver, a Digital Versatile Disc (DVD) player, a compact disc (CD) player, and a Video Cassette Recorder (VCR) player.

Regarding claim 3, Takahashi et al. teaches a directional audio delivery apparatus as recited in claim 1, wherein said directional speaker is repositionable with respect to said system (base member 401 for rotably supporting each speaker can rotate the speaker, Col. 4, line 31-38).

Regarding claim 4, Takahashi et al. teaches a directional audio delivery apparatus as recited in claim 1, wherein said apparatus further comprises a beam-attribute control unit operatively connected to said directional speaker (base member that rotates the speaker thereby controlling the direction of the output beam, Col. 5, line 16-20), said beam-attribute control unit controls an attribute (direction of output beam) of the output of said directional speaker.

Regarding claim 5, Takahashi et al. teaches a directional audio delivery apparatus as recited in claim 4, wherein the attribute controlled influences the direction of the ultrasonic output of said directional speaker, or wherein the attribute controlled influences a width of the ultrasonic output of said directional speaker so that the ultrasonic output is angularly constrained based on the width (Takahashi et al. teaches the ability to influence the direction or the ability to influence the width of the output. Specifically, Takahashi et al. teaches the base member that rotates the speaker thereby controlling the direction of the output beam, Col. 5, line 16-20).

Regarding claim 6, Takahashi et al. teaches a directional audio delivery apparatus as recited in claim 4, wherein the attribute controlled depends on the position of a user of said audio system or a remote controller for said audio system (the speakers rotate to face the listener and

Art Unit: 4114

direct the output beam to the user, Col. 5, line 21-23; and remote control that is capable of rotating speakers, Col. 4, line 47-51, Fig. 6, 702).

Regarding claim 9, Takahashi et al. teaches a directional audio delivery apparatus as recited in claim 1 further comprising one additional directional speaker to create stereo effect (speakers, Fig. 1, 102, 103).

Regarding claim 10, Takahashi et al. teaches a directional audio delivery apparatus as recited in claim 1, wherein said apparatus further comprises a personalization unit operatively connected to said audio conversion circuitry, said personalization unit modifies the audio signals or the ultrasonic signals in accordance with an audio characteristic associated with a user of said apparatus.

8. Claims 1, 13 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Breed et al (US Pub. No 2001/0038698).

Regarding claim 1, Breed et al. teaches a directional audio delivery apparatus for a system, comprising: a box that receives incoming encoded signals and provides decoded audio signals for use by the system (inherent receiver and demodulation circuitry that receive and decode radio stations respectively, and housing, [0136]); audio conversion circuitry that produces ultrasonic signals based on the decoded audio signals provided by said box (ultrasonic frequency generators [0067]); and a directional speaker that outputs an ultrasonic output based on the ultrasonic signals (the speakers being controllable based on the determined positions of the occupants such that at least one speaker directs sounds toward each occupant, [0069]).

Regarding claim 13, Breed et al. teaches a directional audio delivery apparatus as recited in claim 1, wherein said directional audio delivery apparatus further comprises: an environmental adjustment unit operatively connected to said audio conversion circuitry (The monitoring system may be any type of system which is capable of determining the location of the occupant, [0070]), said environmental adjustment unit modifies the audio signals or the ultrasonic signals in accordance with a piece of information related to the environment in the vicinity of a user of said apparatus or a device used by the user (the speakers being controllable based on the determined positions of the occupants such that at least one speaker directs sounds toward each occupant, [0069]).

Regarding claim 14, Breed et al. teaches a directional audio delivery apparatus as recited in claim 13, wherein the piece of information is determined based on a position of the user (the speakers being controllable based on the determined positions of the occupants, [0069]), or wherein the piece of information includes a noise level.

9. Claims 16-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Norris et al. (US Pub. No. 2001/0055397).

Regarding claim 16, Norris et al. teaches a method for providing directionally constrained audio to a user using a directional speaker, said method comprising: receiving audio signals to be delivered to the user from an audio device (audio amplifier which powers speakers, [0025]); receiving a beam attribute input (the beam attribute is the direction of the beam where the alignment of the speaker with a desired orientation would then be a function of providing positional data to the servo system which controls the parametric speakers by mechanical

Art Unit: 4114

pivoting devices which rely on preprogrammed control signal inputs, [0027] or where the beam attribute is the frequency where it can and typically will be a function of the desired distance from the emitter to the reflective surface., [0028]); and driving the directional speaker to generate the directionally constrained audio, wherein the beam attribute input controls at least one attribute of the directionally constrained audio (each parametric speaker includes means for directional alignment, [0025] or frequency, [0028]).

Regarding claim 17, Norris et al. teaches a method as recited in claim 16, wherein said method further comprises: converting the audio signals to ultrasonic signals (emitting ultrasonic sound from parametric speakers, see abstract), wherein said driving includes at least driving the directional speaker in accordance with the ultrasonic signals to produce ultrasonic output for providing the directionally constrained audio (emitting ultrasonic sound from a parametric speaker oriented toward a reflective surface, [0012]).

Regarding claim 18, Norris et al. teaches A method as recited in claim 17, Wherein said method further comprises altering orientation of the directional speaker (the alignment of the speaker with a desired orientation would then be a function of providing positional data to the servo system which controls the parametric speakers by mechanical pivoting devices which rely on preprogrammed control signal inputs, [0027]) or a reflector associated therewith.

Regarding claim 19, Norris et al. teaches a method as recited in claim 17, wherein the beam attribute depends on a distance associated with the ultrasonic output or a position reference from an object (Sound emissions from the parametric output remain in the focused beam columns 16, 17 and 18 which are oriented to be outside a listener location, [0041]).

Regarding claim 20, Norris et al. teaches a method as recited in claim 17, wherein the beam attribute input being received is automatically provided, without user interaction (Alignment with a desired orientation would then be a function of providing positional data to the servo system by preprogrammed control signals, [0027]).

Regarding claim 21, Norris et al. teaches a method as recited in claim 17, wherein said method further comprises providing conventional audio (conventional speakers 30, [0025]), wherein the beam attribute input selects audio output from at least one of the directionally-constrained audio and the conventional audio (As part of this method, various combinations of conventional speaker 30 and virtual speaker 24, 25, 26 {It is noted that with to reference to FIGS. 1 and 2, it will be apparent that the location of the virtual speaker 24, 25, or 26 will be a function of the directional orientation of the parametric speakers 20, 21, or 22.} selection may easily be accomplished as a choice of electronic control and activation through the control circuitry 23, [0046]), wherein audio outputs are provided based on transforming the audio signals into ultrasonic signals if directionally-constrained audio is selected, and wherein audio outputs without transforming the audio signals into ultrasonic signals if conventional audio output is selected (the parametric speakers output ultrasonic signals and the conventional speakers output conventional audio signals, see abstract).

Regarding claim 22, Norris et al. teaches a method as recited in claim 17, wherein the directional speaker has a plurality of segments to emit audio output (speakers 20, 21, and 22 within the directional speaker 10, Fig. 1); wherein the segments can be individually controlled for emitting the audio output (servo systems 27, 28, or 29 which are coupled to the respective emitters so they can individually be controlled by their respective servo systems, [0027]), and

Art Unit: 4114

wherein the attribute determines how at least one of the segments should emit the audio output, which affects the width or the direction of the beam (servos control the direction of the parametric speaker output, [0027]).

Claim Rejections - 35 USC § 103

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Art Unit: 4114

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 7, 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. in view of Norris et al. (US Pub. No. 2001/0055397).

Regarding claim 7, Takahashi et al. in view of Norris et al. teaches a directional audio delivery apparatus as recited in claim 4, wherein said directional speaker has a plurality of separately controllable regions, and wherein said beam-attribute control unit activates one or more of the controllable regions to control the ultrasonic output from said directional speaker. Although Takahashi et al. does not explicitly teach a “directional speaker” with separately controllable regions as required, Norris et al. teaches a sound system (Norris et al., Fig. 1, 10) with separately controllable (Each parametric speaker 20, 21, 22 includes means for directional alignment, Norris et al., [0025]) segments (speakers 20, 21, and 22, Fig. 1) that direct sound in various regions (sound output beams 16, 17, and 18). It would have been obvious to combine the teachings of Norris et al. with those of Takahashi et al. because the feature of multiple speakers combined into one housing as a speaker with separately controllable regions is the speaker cabinets (Takahashi et al., Fig. 1, 102 and 103) with a plurality of speakers inside instead of one.

Regarding claim 8, Takahashi et al. in view of Norris et al. teaches a directional audio delivery apparatus as recited in claim 1, wherein said directional speaker has a curved surface, which can be a curved emitting surface or a curved reflecting surface, so that the ultrasonic output produced is intentionally configured to be non-collinear. While Takahashi et al. does not explicitly teach the limitation of a speaker with a curved surface, Norris et al. teaches a curved surface of the speaker (Norris et al., Fig. 1, 10) where the curved surface is formed by the

Art Unit: 4114

configuration of the directional speakers (Norris et al., Fig. 1, 20, 21, 22) in a curved formation. The directional speakers create a non-collinear output. The sound beams (Norris et al., Fig. 1, 16, 17, 18) are non-collinear in their paths (i.e. their linear paths do not lie in the same line) due to the curved surface configuration. It would have been obvious to one of ordinary skill in the art to configure the speaker cabinets of Takahashi et al. with multiple speakers that are configured in a curved surface that outputs non-collinear ultrasonic beams.

Regarding claim 15, Takahashi et al. in view of Norris et al. teaches a directional audio delivery apparatus as recited in claim 1, wherein the ultrasonic outputs from said directional speaker are reflected by at least two reflecting surfaces before propagating into the free space as directionally- constrained audio output (In further detail, the virtual speaker can be provided at two locations, by directing columnar ultrasonic sound at a first surface to produce reflected audio-frequency sound and reflected columnar ultrasonic sound, the reflected columnar sound traveling to a second reflective surface, and there producing at least reflective audio-frequency sound., Norris et al., [0015]). It would have been obvious to one of ordinary skill in the art to modify the system of Takahashi et al. by reflecting the sound wave off of more than one surface as shown by Norris et al.

13. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US Pat. No. 6,643,377) in view of Obradovich (US Pub. No. 2002/0008718).

Regarding claim 11, Takahashi et al. in view of Obradovich teaches a directional audio delivery apparatus as recited in claim 10 except for the portability of the storage device, Obradovich teaches the audio characteristic is provided to said directional audio delivery

Art Unit: 4114

apparatus in a removable, portable data storage device that can be electrically connected to said apparatus (memory 603, Obradovich, [0084]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the storage device portable and removable, since it has been held that making an old device portable or moveable without producing any new or unexpected result involves only routine skill in the art.

Regarding claim 12, Takahashi et al. in view of Obradovich teaches a directional audio delivery apparatus as recited in claim 10, wherein the audio characteristic pertains to a hearing characteristic and/or a hearing preference associated with the user (Portion 1205 can save preferred audio settings based on a users hearing preferences, Obradovich, [0138], Fig. 18).

14. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. in view of Breed et al.

Regarding claim 13, Takahashi et al. in view of Breed et al teaches a directional audio delivery apparatus as recited in claim 1, wherein said directional audio delivery apparatus further comprises: an environmental adjustment unit operatively connected to said audio conversion circuitry (The monitoring system may be any type of system which is capable of determining the location of the occupant, Breed et al., [0070]), said environmental adjustment unit modifies the audio signals or the ultrasonic signals in accordance with a piece of information related to the environment in the vicinity of a user of said apparatus or a device used by the user (photo sensor unit 404 for receiving a rotation command for rotating the speaker, Takahashi et al., col. 4, 33-36).

Regarding claim 14, Takahashi et al. in view of Breed et al teaches a directional audio delivery apparatus as recited in claim 13, wherein the piece of information is determined based on a position of the user (the speakers being controllable based on the determined positions of the occupants, Breed et al., [0069]), or wherein the piece of information includes a noise level.

It would have been obvious for one of ordinary skill in the art to combine the teachings of Takahashi et al. and Breed et al. by using the position sensing of Breed et al. with the device of Takahashi et al.

15. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Norris et al. (US Pub. No. 2001/0055397) in view of Pompei (Journal of the Audio Engineering Society).

Regarding claim 23, Norris et al. in view of Pompei teaches a method as recited in claim 17, wherein the attribute input is for increasing the frequency of the ultrasonic signals to increase the width of the beam (Norris et al. teaches frequency adjustment, Norris et al., [0028]. Pompei teaches that when the frequency of the ultrasonic carrier signal is increased, the width of the beam increases, Pompei, Fig. 8). It would have been obvious for one of ordinary skill in the art to adjust the frequency beam attribute input of Norris et al. in order to increase the width of the beam.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Cooper et al. (US Pat. No. 3,942,139) teaches an ultrasonic wave that reflects off of more than one surface.

Manabe (US Pat. No. 6,556,687) teaches a super-directional loudspeaker. This loudspeaker is comprised of a supporting member having a concave surface, and electro-acoustic transducer elements fixed to the supporting member.

Power (US Pat. No. 5,764,595) teaches that the width of a beam varies with the square root of the frequency; the narrowest beam corresponding to the highest frequency and the broadest to the lowest frequency.

Tanaka et al. (US Pat. No. 4,823,908) teaches a parametric loudspeaker that can be combined with any other loudspeaker.

Inanaga et al. (US Pat. No. 5,495,534) teaches ultrasonic signals that can be used to determine the location of a user.

Hayes (US Pat. No. 5,764,782) teaches an acoustic reflector the greater the signal frequency above a predetermined design frequency the more perfectly it resembles a wide omnidirectional wave.

Marash et al. (US Pat. No. 6,594,367) teaches that the width of a beam is dependent on the frequency of the signal.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kile O. Blair whose telephone number is (571) 270-3544. The examiner can normally be reached on Monday-Friday.

Art Unit: 4114

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joe H. Cheng can be reached on (571) 272-4433. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joe H Cheng/
Supervisory Patent Examiner, Art Unit 4114

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10/29/07